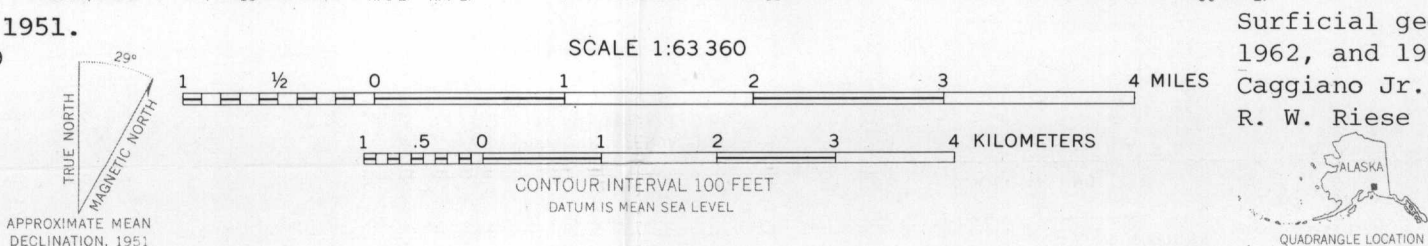


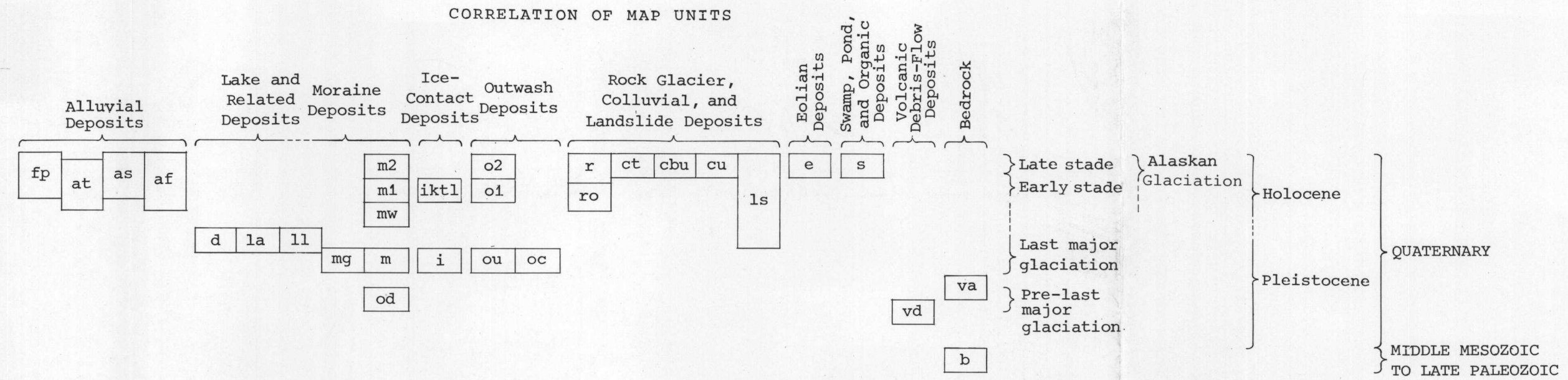
Base from U.S. Geological Survey, 1951.  
Minor revision 1963, 1967, and 1979

Surficial geology mapped in 1960, 1961,  
1962, and 1966. Assisted by J. A.  
Caggiano Jr., J. L. Moore, and  
R. W. Riese



## PRELIMINARY SURFICIAL GEOLOGIC MAP OF THE VALDEZ C-1 QUADRANGLE, ALASKA

By  
Lynn A. Yehle  
1980



### DESCRIPTION OF MAP UNITS

[Map units are considered to be 1 m or more thick. Sizes of unconsolidated particles follow scale of Wentworth (1922). Age symbol "Q" omitted from map symbols as all units (with the exception of unit "b") are of Quaternary age]

#### ALLUVIAL DEPOSITS

- fp Flood-plain deposits (Holocene)--Chiefly sandy gravel and gravel deposited along low-gradient, major- and moderate-sized streams. Includes some low terrace deposits as much as a few meters higher than the stream level; includes outwash of Long Glacier. Thickness commonly less than 20 m
- at Terrace deposits (Holocene)--Mostly sandy gravel and gravel deposited in former stream courses adjacent to present major streams. At various levels up to many dozens of meters higher than the present stream. Thickness commonly less than 10 m
- as Fine-grained alluvial deposits (Holocene)--Chiefly sand but ranges from silty sand and organic sand to pebbly sand. Unit includes some pond and swamp deposits; forms the distal ends of alluvial fans and also flood plains of low-gradient small streams. Deposits in many places overlie glacial outwash channel deposits. Thickness less than 5 m. Widespread in lowland areas
- af Alluvial fan deposits (Holocene)--Mostly gravelly sand and gravel deposited by active, steep-gradient streams. Thickness less than 15 m. Widespread along mountain slopes

#### LAKE AND RELATED DEPOSITS

- d Delta(?) deposits (Holocene and Pleistocene)--Composed chiefly of gently dipping gravelly sand. At apex merges with alluvial fans. Thickness possibly 100 m. Located near Elliott Creek and north of Strelna
- la Lake deposits (Holocene and Pleistocene)--Chiefly (1) laminated to massive silt and clay and (2) some pebbly silt and clay. Deposited in glacial lake Atna (Nichols, 1965). Covers most areas between hills below altitudes of about 450 m (1500 ft) and, locally, 600 m (2000 ft). Intertongues with lacustrine lag deposits. Thickness less than 5 m
- ll Lacustrine lag deposits (Holocene and Pleistocene)--Mostly variably stony silt and clay; includes scattered concentrations of cobbles and boulders. Mantles gently sloping low hills of glacial drift below altitudes of 450 m (1500 ft) and, locally, 600 m (2000 ft). Formed by wave and current action in glacial lake Atna. Intertongues with finer grained lake deposits. Thickness as much as 3 m

#### MORaine DEPOSITS

- mg Ground-moraine deposits (Pleistocene, last major glaciation)--Mostly glacial till formed into irregularly shaped to uniformly linear hills and some small uneven plains. Locally, till is clast-sparse. Includes some stratified sand and pebble gravel and some small unmapped bedrock outcroppings. Widespread except below about 450 m (1500 ft) altitude and locally below 600 m (2000 ft) where upper part of unit reworked to lake and lacustrine lag deposits. Thickness probably less than 25 m
- m2 End moraine deposits near Long Glacier river (Holocene, late stage of Alaskan Glaciation of Karlstrom, 1964, Péwé, 1975)--Glacial till with a high percentage of coarse clasts. Thickness probably less than 15 m
- m1 Kame and moraine deposits downstream from mouth of Long Glacier river (Holocene, early stage of Alaskan Glaciation)--Sandy pebble gravel largely of ice-contact kame and ablation(?) moraine origin. Thickness probably less than 20 m
- mw Moraine and other drift deposits near Willow Creek (Holocene, early(?) stage of Alaskan Glaciation)--Mostly till and some silty sandy gravel in low, hummocky hills and small, sloping plains; locally, characterized by numerous ponds. Thickness probably less than 20 m
- m Lateral moraine deposits (Pleistocene, last major glaciation)--Linear ridges composed chiefly of moderately to very stony till. Mapped largely along upper Kotsina River valley and along southwest flank of mountain front in center of quadrangle at altitudes mostly higher than 450 m (1500 ft). In part, landforms merge to ridges of bedrock, shaped by glacial erosion. Thickness probably less than 15 m
- od Old drift(?) deposits (Pleistocene, pre-last major glaciation)--Scattered subrounded pebbles and cobbles mixed with frost-shattered and churned rubble on moderate slopes near Hubbard Peak 1740 m (5700 ft). Thickness about 1 m. If materials are glacial drift, they probably were deposited during a glaciation much more extensive and older than the last major glaciation

#### ICE-CONTACT DEPOSITS

- ikt1 Kame-terrace deposits near Long Glacier river (Holocene, early stage of Alaskan Glaciation)--Ice-contact, kame-terrace deposits consisting of moderately well bedded gravelly sand and gravel. Gently sloping. Thickness less than 10 m
- i Ice-contact deposits, undifferentiated (Pleistocene, last major glaciation)--Mostly gravelly sand and some silty gravel formed into a variety of landforms ranging from small, irregularly shaped hills (kames) to sinuous ridges (eskers). Thickness less than 15 m. Common along lower mountain slopes in center of area and northwest of Strelna Creek

#### OUTWASH DEPOSITS

- o2 Outwash deposits near mouth of Long Glacier river (Holocene, late stage of Alaskan Glaciation)--Chiefly pebble and some cobble gravel and sand in remnants of former glacial streams at several different altitude levels. Thickness less than 10 m
- oi Outwash valley train southwest of mouth of Long Glacier river (Holocene, early stage of Alaskan Glaciation)--Chiefly sandy gravel on a gently sloping surface; thickness less than 10 m
- ou Outwash deposits, undifferentiated (Pleistocene, last major glaciation)--Chiefly stratified sandy pebble to cobble gravel; somewhat finer grained materials may predominate near the surface. Deposited as valley trains that drained mostly northwestward. Includes some outwash terraces several meters higher than bulk of the outwash deposits. Less than 20 m in thickness. Exposed at several localities between Loraine and Strelna Creeks
- oc Outwash-channel deposits (Pleistocene, last major glaciation)--Chiefly sandy pebble to cobble gravel in generally narrow channels parallel to slope or crossing narrow drainage divides. Locally, where too small to map, shown by line symbol and arrow showing direction of flow. Overlain in many places by fine-grained alluvial, and swamp, pond, or organic deposits. Thickness less than 5 m. Widespread in lowland areas
- r Rock glacier deposits, undifferentiated (late Holocene)--Bedrock rubble chiefly of boulder size formed in many places into arcuate ridges and swales under the influence of gravity and probably interstitial ice. Some deposits clearly active. Thickness may be as much as 100 m. Most deposits on steep slopes in upper valleys of Elliott Creek and Kotsina River
- ro Old rock glacier deposits (late and early(?) Holocene)--Large rock glaciers mostly downvalley from, and in places overrun by younger rock glaciers. Deposits presumably not active. Some deposits located in upper Elliott Creek valley and along mountain slopes southwest of Long Glacier

#### Talus (Holocene)--Bedrock fragments largely of cobble and pebble size derived by weathering and transported by gravity processes. Thickness probably less than 10 m. Common along steep slopes of upper tributaries of Elliott Creek and Kotsina River

- ct Talus (Holocene)--Bedrock fragments largely of cobble and pebble size derived by weathering and transported by gravity processes. Thickness probably less than 10 m. Common along steep slopes of upper tributaries of Elliott Creek and Kotsina River
- cbu Colluvial deposits, undifferentiated (Holocene)--Widely distributed heterogeneous deposits consisting of clasts of various sizes, chiefly pebbles in a matrix mostly of silt and sand. Includes some organic and eolian deposits. Formed mostly on moderate to steep slopes by weathering of glacial drift and bedrock, and subsequently transported and mixed by gravity processes. Thickness probably less than 10 m
- cu Colluvial deposits derived mostly from unconsolidated geologic materials (Holocene)--Materials include mostly drift and alluvial deposits and minor organic and eolian deposits. Principal exposures along middle reach of Kotsina River near the mouth of Elliott Creek
- ls Landslide deposits (Holocene and Pleistocene)--Various types of landslide deposits ranging from slurry flows to deep-seated slides involving very large volumes of bedrock. Thickness may be as much as 150 m. Principal exposures along Elliott Creek and south of mouth of Long Glacier river
- e EOLIAN DEPOSITS (HOLOCENE)--Chiefly sand, with some silt and granule-sized particles; some active dunes. Covered in many places by silty to sandy organic deposits too thin to map separately. Thickness as much as 20 m. Located principally in southwestern corner of map area; thins northeastward
- s SWAMP, POND, AND ORGANIC DEPOSITS (HOLOCENE)--Silty organic deposits to organic-rich fine sandy silt. Grades to fine-grained alluvial deposits and to outwash channel deposits. Many deposits too small to show on map. Thickness less than 3 m. Widespread except on upper flanks of mountains

- vd VOLCANIC DEBRIS-FLOW DEPOSITS (LATE PLEISTOCENE)--Volcanic-rich diamicton having differently colored, mostly boulder-sized clasts some of which are as much as 15 m in maximum dimension; matrix composed chiefly of silty sand with pebble- and some cobble-sized volcanic rocks, and locally, materials rich in montmorillonite clay. Exposed locally along bluffs of Kotsina River; also present northwest and southeast of map area; best exposures about 15 km to northwest (L. A. Yehle and D. R. Nichols, unpub. data, 1979). Overlain by andesite flow rock and unconsolidated deposits. Thickness possibly as much as 35 m
- va ANDESITE (late Pleistocene)--One or more lava flows of dark-gray to black andesite having a glassy groundmass crowded with phenocrysts of plagioclase (as long as 5 mm), some pyroxenes, and a few accessory minerals; numerous vesicles. Well developed columnar jointing in exposures along Kotsina River bluffs. Open-work rubble is present at base of flow along northwest side of Kotsina River 3 km downstream from mouth of Loraine Creek. Thickness may average 25 m. Widespread west of Kotsina River
- b Undifferentiated pre-Quaternary bedrock (middle Mesozoic to late Paleozoic)--Includes a variety of rock types principally greenschist, shale, limestone, conglomerate, greenstone, and granitic rocks (Moffitt, 1938; Beikman and others, 1977)
- CONTACT--Approximately located; dotted between minor subdivisions within a map unit based on relative differences in geomorphology or apparent age
- ABANDONED OUTWASH CHANNEL--Too small to map; arrow shows direction of gradient of channel
- ESCARPMENT--Prominent within map unit; hachures on downslope side
- RIDGES--Prominent linear ridges (drumlins or fluted landforms) or prominent sinuous ridges (eskers) within map
- SAMPLE LOCALITY--Two K-Ar dates for andesite sample from near mouth of Loraine Creek. Age no older than about 200,000 years at 95 percent confidence level (J. D. Obradovich, written commun., 1979; U.S. Geological Survey sample nos. DKA 3763 and 3810)

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